RevolveAir / Guardian

Breathing Air Cylinder Fill Station

Operating Instructions

Contents

IMPORTANT SAFETY INSTRUCTIONS **2**

Limited Warranty **3**

1 - Introduction **4**
- Safety Labels 4
- Cascade Storage System 5
- Safety Notations 6
- Routine Maintenance 6
- Storage Cylinder Inspection 6

2 - Pre-Operation Checks **7**
- Working with Compressed Air 7
- Cylinder Inspection 8

3 - RevolveAir Operation **9**
- Charging breathing air Cylinders using the RevolveAir Fill Station 9
- RevolveAir - Fill Pressure Adjustment 10
- Revolve Air - Cylinder Mounting and Charging 12

4 - Guardian Operation **15**
- Charging breathing air Cylinders using the Guardian Fill Station 15
- Guardian - Fill Pressure Adjustment 16
- Guardian - Cylinder Mounting and Charging 18

5 - Index **23**

Maintenance Record **24**

RevolveAir/Guardian
Operator's Manual
SCOTT P/N 595073-01 REV B 6/12

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IMPORTANT SAFETY INSTRUCTIONS

To reduce the risk of fire, electrical shock, injury to persons, or damage when using this equipment, follow basic precautions including the following:

1. Read and follow ALL user instructions and recommended procedures and safety precautions as provided in this manual. Failure to do so could result in serious injury or death.
2. Read and follow all **DANGER**, **WARNING**, and **CAUTION** statements in this instruction. Failure to do so could result in serious injury or death. These statements use the following pattern:

   DANGER

   Danger is used to indicate the presence of a hazard that **will** cause severe personal injury, death, or substantial equipment damage if the warning is ignored.

   WARNING

   Warning is used to indicate the presence of a hazard which **may** cause severe personal injury or substantial component damage if the warning is ignored.

   CAUTION

   Caution is used to indicate the presence of a hazard which can cause minor personal injury or component damage if the warning is ignored.

   NOTE

   Notes are used to notify the operator of installation, operation, or maintenance information that is important but not hazard-related.
3. Do not operate this equipment while under the influence of drugs, alcohol, or any medications or substances which may affect vision, dexterity, or judgment. Users of this equipment must be in good physical and mental health in order to operate safely. Do not use this equipment when fatigue prevents safe operation. Stay alert when operating this equipment. Inattention or carelessness while operating this equipment may result in serious injury or death.
4. Training is required before use of this equipment. Improper use may result in serious injury or death. Improper use includes, but is not limited to, use without adequate training, disregard of the warnings and instructions contained herein, use of the equipment for purposes not included in these instructions, and failure to inspect and maintain the equipment.
5. All electrical connections shall be installed by a qualified electrician in accordance with applicable electrical codes and shall include proper grounding of the equipment.
6. All service must be performed by qualified trained technicians. When servicing, disconnect power from the equipment and follow all necessary Lock-Out/Tag-Out procedures and safety procedures.
7. Hot surfaces can cause serious injury. Allow the equipment to cool before servicing.
8. Establish a schedule for performing routine maintenance as outlined in these instructions.
9. Refer to the Material Safety Data Sheet (MSDS) for instructions on the safe handling of any chemicals used in the maintenance or servicing of this equipment.
10. Moving parts can cause serious injury. Be sure all guards and covers are in place and secure before starting the unit.
11. High pressure air is dangerous. Handle the high pressure air connections and hoses with care to prevent serious injury or death.
12. The air produced by this equipment must be recertified periodically as meeting CGA Grade D or better breathing quality air. Regular recertification to this standard is the responsibility of the user.
13. If this equipment does not operate as described in these instructions, DO NOT USE THE EQUIPMENT. Follow your procedures to remove the equipment from service including any "Lock-out/Tag-out" procedures to prevent use of the equipment. Contact authorized personnel to inspect and service the equipment.
14. If you have any questions or concerns regarding the installation, use, or maintenance of this equipment, contact your authorized SCOTT distributor, or contact SCOTT at 1-800-247-7257 (or 704-291-8300 outside the continental United States) or visit our web site at www.scottsafety.com.

SAVE THESE INSTRUCTIONS.

Limited Warranty

SCOTT SAFETY

Limited Warranty on Scott Breathing Air Cylinder Fill Station Products

Scott Safety (SCOTT), a division of Scott Technologies, Inc., warrants all of its BREATHING AIR CYLINDER FILL STATION PRODUCTS to be free from defects in workmanship and materials for a period of one (1) year from the date of original manufacture by SCOTT. This warranty applies to all components of these products except expendable or consumable components. SCOTT's obligation under this warranty is limited to replacement or repair (at SCOTT's option) of these products when shown to be defective in either workmanship or materials.

Only SCOTT personnel or, when directed by SCOTT, SCOTT authorized agents are permitted to perform warranty obligations. This warranty does not apply to defects or damage caused by repairs of or alterations to SCOTT BREATHING AIR CYLINDER FILL STATION PRODUCTS made by owner or any third party unless expressly permitted by SCOTT product manuals or by written authorization from SCOTT. To obtain performance under this warranty, and as a condition precedent to any duty of SCOTT, the purchaser must present such products to SCOTT, a SCOTT authorized distributor, or a SCOTT authorized service center. Any product returned to SCOTT shall be sent FOB destination to Scott Safety (Attn. Warranty Claim Department) 4320 Goldmine Road, Monroe, NC 28111.

This warranty does not apply to any malfunction of or damage to these products resulting from accident, alteration, misuse, or abuse, which includes and is not limited to failure to perform preventative maintenance recommended by SCOTT.

THIS WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN ADDITION, SCOTT EXPRESSLY DISCLAIMS ANY LIABILITY FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY CONNECTED WITH THE SALE OR USE OF SCOTT SAFETY PRODUCTS AND NO OTHER FIRM, OR PERSON IS AUTHORIZED TO ASSUME SUCH LIABILITY.

SCOTT RevolveAir/Guardian Operator's Manual

1 - Introduction

Congratulations on your purchase of a SCOTT Safety fill station. This manual provides instructions for charging breathing air cylinders using RevolveAir and Guardian fill stations.

SCOTT Safety provides a full line of breathing air system components and related accessories for the safe production and storage of compressed breathing air. Configurations of breathing air systems will vary depending on selected options. Operators of these units must become familiar with their particular system configuration and refer to the proper operating instructions.

These fill stations are intended only for charging breathing air cylinders. The air compressor and purification system used with these fill stations to fill breathing air cylinders must produce compressed air which meets the requirements for Grade D or higher compressed air as specified in the Compressed Gas Association publication CGA G-7.1 entitled *Commodity Specification for Air,* available from the Compressed Gas Association, Inc., 1725 Jefferson Davis Hwy., Suite 1004, Arlington, VA 22202. In addition to meeting the requirements of Grade D or higher, the air must be dry to a dew point of -65° F (-54° C) or less.

The fill station may be installed with storage cylinders or a manual or an automatic cascade system. Refer to the **Cascade Storage System** and **Storage Cylinder Inspection** sections of this instruction for details.

IMPORTANT

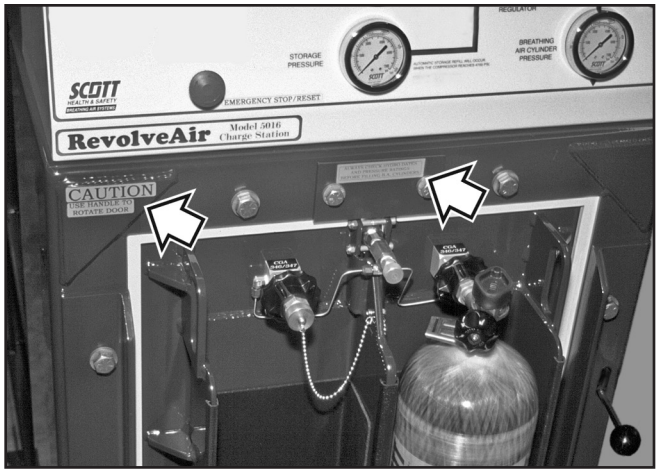
Follow ALL recommended procedures and safety precautions as provided in this manual. Federal, State and local codes mandate safety precautions and procedures for the handling and production of breathable air. Consult State and local occupational health and industrial safety ordinances for additional requirements.

Proper installation of the RevolveAir and Guardian fill stations must be performed in accordance with SCOTT Safety requirements, for optimum performance and adequate warranty coverage. Maintenance and repair of the system must be performed by a SCOTT trained and certified technician.

For additional information regarding the design, operation, or service of the fill station unit, contact SCOTT Safety at 1-800-247-7257.

Safety Labels

Note the safety labels that are affixed to the unit as a reminder of important safety precautions. Always read and understand all safety labels prior to operating the unit. Safety labels should never be removed, defaced, or covered.



Read and follow all safety labels on the unit.

Cascade Storage System Theory of Operation

The principle of a cascade air storage system is to make the most efficient use of the air stored in multiple storage cylinders to fill breathing air cylinders. This is achieved by always drawing air first from the storage cylinder with the lowest pressure and then switching to the storage cylinder with the next highest pressure until the breathing air cylinder has reached the target fill pressure. Based on a four cylinder storage system, if the first storage cylinder has less pressure than the target pressure for the breathing air cylinder, the breathing air cylinder will be filled until its pressure equals that of the first storage cylinder. The first storage cylinder is then closed and the next higher pressure storage cylinder is opened to add air to the breathing air cylinder. If the pressure in the second storage cylinder is still below the target pressure, the second storage cylinder is closed and the third storage cylinder is opened. If necessary, the fourth storage cylinder is used to finally reach the target pressure in the breathing air cylinder. When the fourth storage cylinder drops below the target pressure, no more breathing air cylinders can be filled to the target pressure until the storage system is refilled by the compressor.

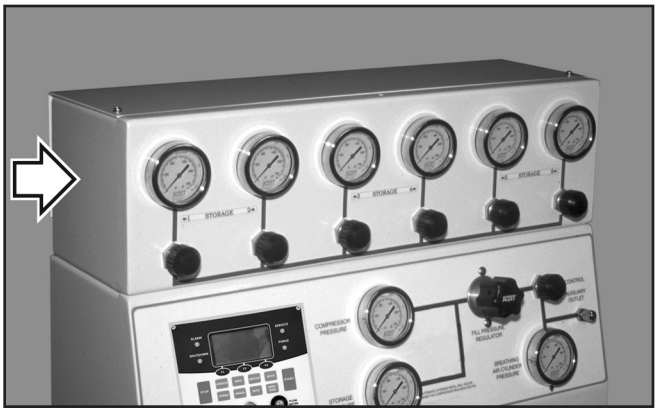
With a Manual Cascade system, the operator must continually monitor the air pressure in each of the storage cylinders while manually opening and closing each storage cylinder to fill breathing air cylinders.

With a SCOTT Smart Fill Auto Cascade system, pressure sensing valves automatically select the air supply from each of the storage cylinders. The system opens and closes the storage cylinders to efficiently use all the available air to fill the breathing air cylinders. The operation of the SCOTT Smart Fill Auto Cascade system does not require additional tasks or adjustments by the operator.

On standalone storage systems that are separate from the filling compressor, the SCOTT Smart Fill Auto Cascade system will make the best use of the stored air between fill-ups from the compressor.

For systems with an integral compressor, the operator can choose to turn OFF the compressor after filling the storage and then fill the breathing air cylinders. The SCOTT Smart Fill Auto Cascade system will provide the maximum number of fills before turning the compressor back ON.

Systems using more than four storage cylinders can be configured with the cylinders in four banks with sets of cylinders in each bank.



Manual Cascade Air Storage - Control Panel

Smart Fill Auto Cascade Charging System

Safety Notations

The following types of safety notations are used throughout this manual:

⚠ DANGER

Danger is used to indicate the presence of a hazard that will cause severe personal injury, death, or substantial equipment damage if the warning is ignored.

⚠ WARNING

Warning is used to indicate the presence of a hazard which may cause severe personal injury or substantial component damage if the warning is ignored.

⚠ CAUTION

Caution is used to indicate the presence of a hazard which can cause minor personal injury or component damage if the warning is ignored.

NOTE

Notes are used to notify the operator of installation, operation, or maintenance information that is important but not hazard-related.

Routine Maintenance

The reliable operation of this equipment depends on proper care and routine maintenance.

The operator must be fully trained in the proper operation of the fill station. The operator must read, understand, and adhere to all safety precautions and as described in this manual.

All scheduled maintenance must be noted by the operator to be performed by a SCOTT trained and certified service technician. A Maintenance Record page is provided in this instruction.

For information on maintenance procedures, call 1-800-247-7257 or contact an authorized SCOTT Safety distributor.

Storage Cylinder Inspection

Inspect the storage cylinders and verify the latest inspection date. Storage cylinder inspection should be performed on a routine basis, as determined by specific organization requirements.

DOT cylinders must be visually inspected and hydrostatically tested by a licensed cylinder re-tester in accordance with the appropriate US Department of Transportation (DOT) specification or applicable DOT exemption, or in accordance with the appropriate Transport Canada (TC) Permit of Equivalent Level of Safety. Depending on when the DOT storage cylinders were purchased, this may be five (5) or ten (10) years. Cylinders that must be tested every five (5) years are stamped with the ***DOT and TC*** numbers around the top of the cylinder. Cylinders that must be tested every ten (10) years are stamped with the number ***ISO9809-02*** around the top of the cylinder. Verify the required re-test schedule for your DOT storage cylinders and establish a procedure for having the cylinders re-tested to that schedule.

The date of manufacture marked on the cylinder is also the date of the first hydrostatic test. Subsequent test dates are indicated by labels affixed to the cylinder.

If the required hydrostatic test date has expired for the DOT cylinder, DO NOT USE the cylinder. Notify a supervisor or other certified personnel responsible for cylinder inspection.

⚠ DANGER

Do not refill any cylinder that is damaged or not within the prescribed hydrostatic test date as determined by the appropriate US Department of Transportation (DOT) specification or the applicable DOT exemption or in accordance with the appropriate Transport Canada (TC) Permit of Equivalent Level of Safety. Damaged cylinders may suddenly leak or rupture if charged with compressed air. Failure to inspect for damage and to empty the air from damaged cylinders may result in personal injury or death.

ASME cylinders do not require hydrostatic testing, but include a drain valve and gauge. If installed, safety valves on ASME cylinders must be tested on an annual basis. ASME safety valves can by identified by a tag or label showing traceability to the National Bureau of Standards (NB) and a tamper evident seal. Some SCOTT storage systems with ASME storage cylinders are protected by single use rupture disks that cannot be tested.

Refer to specific ASME or DOT safety standards for additional testing information.

2 - Pre-Operation Checks

⚠ DANGER

Before use, this equipment must be properly installed and inspected by a SCOTT Safety trained and certified technician. Do not operate if the equipment has not been prepared by a SCOTT authorized service technician. Use of this equipment without proper set up may result in serious personal injury, death, or permanent equipment damage.

⚠ DANGER

Training is required before use of this equipment. Improper use of this equipment may result in serious injury or death. Improper use includes, but is not limited to, use without adequate training, disregard of the warnings and instructions contained herein and failure to inspect and maintain this equipment.

⚠ DANGER

If any air leak is noted, or the equipment does not operate as described in this manual, immediately terminate its use and consult with a certified service technician before proceeding. Use of malfunctioning equipment may create circumstances resulting in serious personal injury or death.

⚠ DANGER

The misuse of compressed air can cause severe injury or death. Take every precaution in the use of compressed air. Always remember to release all residual air pressure from the compressor system before repairing or doing maintenance work.

IMPORTANT

Perform all pre-operation checks prior to starting the unit. Establish and maintain a pre-operation inspection procedure for the compressor and related accessories. Routine inspection of the equipment is the responsibility of the organization using the equipment, and must be in accordance with technical and service guidelines provided by SCOTT Safety.

Working with Compressed Air

High-pressure air can be dangerous.

NEVER tighten, loosen, or adjust any type of fitting that is under pressure.

NEVER adjust a safety relief valve. Interfering with system settings can result in serious damage or injury.

NEVER perform any service on this equipment unless the electric power is switched OFF at the main terminal, the compressor is completely stopped, and all residual air pressure has been released from the system. Follow the recommendations of the OSHA Lock Out/Tag Out procedures.

NEVER pass in front of an air outlet when compressed air is being released. High pressure air could cause injury.

NEVER attempt to straighten or reuse bent tubes or utilize any damaged fittings.

NEVER charge a breathing apparatus or air storage cylinder beyond the rated working pressure.

NEVER fill a breathing air cylinder that has not been inspected according to these instructions and verified to be acceptable for filling.

REMEMBER - Electric power supply must be installed in accordance with local, state, and federal electrical code requirements.

REMEMBER - Compressed air can kill. Treat it with respect.

Cylinder Inspection

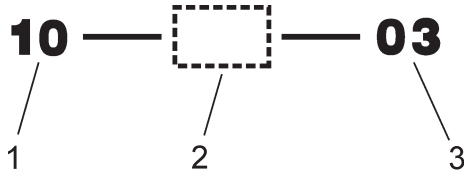
Refer to the guidelines listed in "Working with Compressed Air," on page 7.

Refer to current applicable publications on compressed gas cylinder inspection available from Compressed Gas Association Inc., 1725 Jefferson Davis Hwy., Suite 1004, Arlington, VA 22202, (703-412-0900) for a detailed explanation of cylinder inspection procedures.

Check the latest cylinder hydrostatic test date to ensure it is current.

All breathing air cylinders must be visually inspected regularly and hydrostatically tested by a licensed cylinder retester in accordance with the appropriate US Department of Transportation (DOT) specification or applicable DOT exemption, or in accordance with the appropriate Transport Canada (TC) Permit of Equivalent Level of Safety.

The date of manufacture marked on the cylinder is also the date of the first hydrostatic test. See the example cylinder stamp in the following illustration.



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Cylinder Date of Manufacture

1) Month

2) Manufacturer or Tester stamp

3) Year

For a complete listing of retest date requirements for SCOTT Safety breathing air cylinders, refer to the current revision of Safety Precautions for Air-Pak Cylinders, SCOTT P/N 89080-01. This publication is included in the literature provided with your SCOTT supplied air respirator, or upon request from SCOTT Safety.

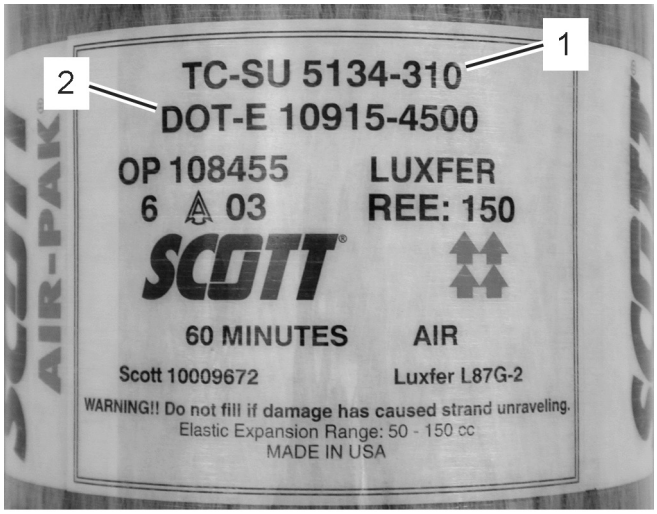
For other breathing air cylinders, consult the cylinder manufacturer's recommendations and the requirements of the appropriate national regulatory agencies.

It is the responsibility of your organized respiratory protection program to arrange for visual inspection and hydrostatic testing of cylinders by a licensed retester.

Visually inspect cylinder and valve assembly for physical damage such as dents or gouges in metal or in composite wrapping.

Cylinders which show physical damage or exposure to high heat or flame, such as paint turned brown or black, decals charred or missing, pressure gauge lens melted or elastomeric bumper distorted, and cylinders which show evidence of exposure to chemicals such as discoloration, cracks in the cylinder or the composite wrapping, peeling of the outer layers of the composite wrapping and/or bulging of the cylinder wall, shall be removed from service and emptied of compressed air.

Always check the pressure rating of the selected breathing air cylinder(s) to be filled. The rated pressure usually follows the DOT or TC material identification as in this illustration.



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Cylinder Identification and Pressure Rating

1) Transport Canada Identification and Rating (310 bar)

2) Department of Transportation (DOT) Identification and Pressure Rating (4500 psi)

3 - RevolveAir Operation

Charging breathing air Cylinders using the RevolveAir Fill Station

This chapter provides instructions for filling breathing air cylinders using the RevolveAir fill station.

The RevolveAir fill station is identified by a turntable chamber door that allows for simultaneous charging of two breathing air cylinders while a second set of cylinders is being mounted.

IMPORTANT

Before charging any breathing air cylinder, ALWAYS perform a thorough cylinder inspection, as instructed on page 8.

⚠ DANGER

Do not refill any cylinder that is damaged or not within the prescribed hydrostatic test date, as determined by the appropriate US Department of Transportation (DOT) specification or the applicable DOT exemption, or in accordance with the appropriate Transport Canada (TC) Permit of Equivalent Level of Safety. Damaged cylinders may suddenly leak or rupture if charged with compressed air. Failure to inspect for damage and to empty the air from damaged cylinders may result in personal injury or death.

⚠ DANGER

When charging more than one breathing air cylinder together, charge only cylinders that have the same pressure rating. Failure to follow this instruction can result in cylinder failure and lead to equipment damage, serious personal injury, or death.

⚠ DANGER

If any air leak is noted, or the equipment does not operate as described in this manual, immediately terminate use of the equipment and consult with a certified service technician before proceeding. Use of malfunctioning equipment may create circumstances resulting in serious personal injury or death.

⚠ DANGER

When charging 75 minute 5500 PSI cylinders, there must be **NO** cylinders mounted on the outside of the RevolveAir door.
When charging any other size cylinder, there must be **NO** 75 minute 5500 PSI cylinders mounted on the outside of the RevolveAir door.
Failure to obey these warnings may result in serious injury or death.

⚠ DANGER

Air pressure increases as temperature increases. When charging cylinders in temperatures below freezing (32° F/0° C), frequently check air pressure and release excess pressure as the cylinder warms to normal room temperature. Failure to do so will cause cylinders to be in an overcharge condition, increasing the risk of cylinder failure and leading to personal injury or death.

RevolveAir - Fill Pressure Adjustment

⚠ CAUTION

NEVER use a wrench or other tool to tighten the bleed valves or cylinder adapters. Excessive force will damage the sealing surfaces and result in cylinder leakage.

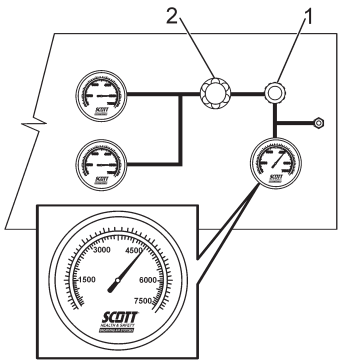
1. Check the pressure rating of the selected breathing air cylinder(s). See "Cylinder Inspection" on page 8.

2. **When charging more than one cylinder, verify that all cylinders are of the same pressure rating.** If they are different, sort them by their rating, and only charge cylinders together that have the same rating. NEVER MIX RATINGS.

⚠ DANGER

NEVER MIX RATINGS! When charging more than one breathing air cylinder together, charge only those cylinders that have the same pressure rating. Failure to follow this instruction can result in failure of the cylinder or cylinder valve, and can lead to equipment damage, serious personal injury, or death.

3. Verify that the compressor or storage pressure is greater than the fill pressure of the selected breathing air cylinder. If pressure is too low, allow the compressor system to continue building pressure.



Cylinder Charging Controls

1) Fill Control Valve

2) Variable Pressure Regulator

4. When system pressure is adequate to fill the breathing air cylinders, unlock the fill station door by operating the handle on the right side of the chamber (YELLOW lock bars NOT showing).

RevolveAir Charging Chamber Unlocked
(YELLOW lock bars NOT showing)

5. Close the Fill Control Valve on the control panel by turning the valve fully clockwise.

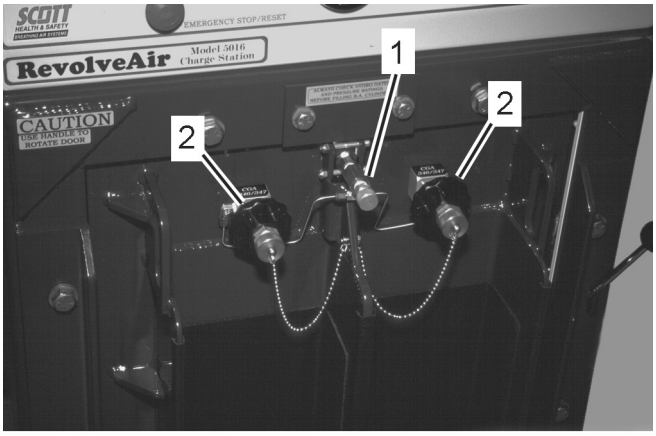
6. For units equipped with a Variable Pressure Regulator: Turn the Variable Fill Pressure Regulator fully counterclockwise until the breathing air Cylinder Pressure Gauge reads zero (0).

   Skip this step if unit is equipped with Dual Pressure Regulator.

⚠ DANGER

Never set the fill pressure higher than the maximum pressure rating for the breathing air cylinders to be filled. Filling breathing air cylinders beyond their maximum pressure rating may result in serious damage to the cylinder or cylinder valve. A damaged cylinder may rupture, and can cause serious personal injury or death.

7. Close both bleed valves on the fill station "finger tight" (one bleed valve on each side of the fragmentation chamber door). DO NOT use tools to tighten.



1) Bleed Valve

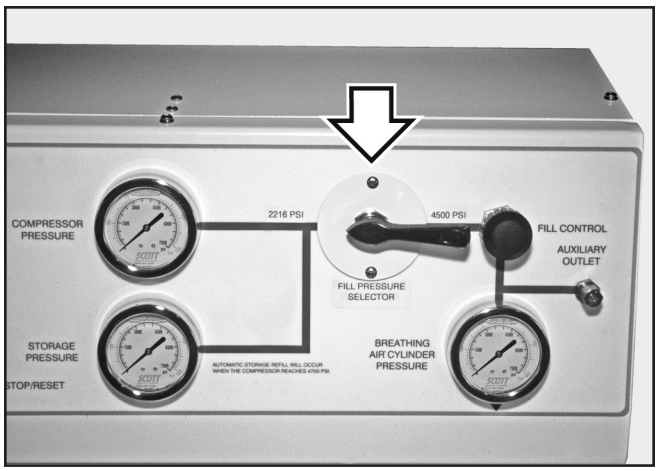
2) Charge Adapters

8. Make sure all four of the cylinder charge adapters are closed and secure (two on each side of the fill station door). Hand-tighten, turning the adapter counterclockwise. DO NOT use tools.
9. Close the charging chamber and lock with the operating handle (with the YELLOW locking bars visible around the chamber door).
10. Open the Fill Control Valve 1/8 to 1/2 turn counterclockwise.
11. For units equipped with a Variable Pressure Regulator: SLOWLY turn the Variable Fill Pressure Regulator knob clockwise until the breathing air Cylinder Gauge shows the target maximum fill pressure for the selected breathing air cylinder(s). **Make sure that the pressure used to charge the cylinder is not higher than the pressure rating on the cylinder.**

NOTE

Always adjust the Fill Pressure Regulator on the "pressure rise." If the fill pressure is accidentally set too high and must be reduced, first turn the knob counterclockwise to at least 500 psi below the desired setting. Turn the knob again clockwise to ensure an accurate fill pressure setting.

12. For units with the Dual Pressure Regulator option, set the switch to the selected breathing air cylinder pressure. No other fill regulator control is available to the operator.



Dual Pressure Regulator Option
Illustration shows pressure set for 2216 psi

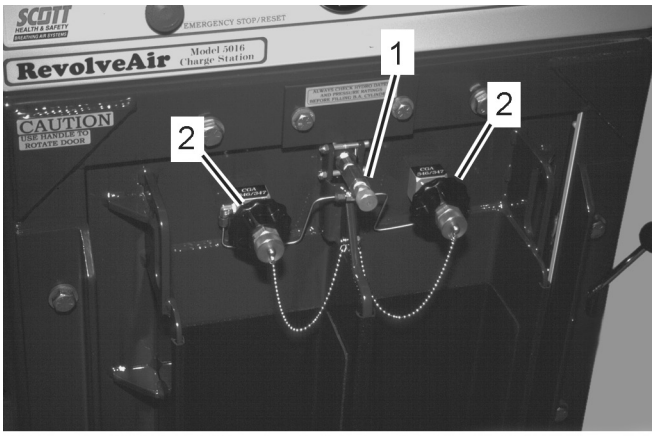
DANGER

DO NOT attempt to charge the breathing air cylinder if the correct pressure setting is not available on the Dual Pressure regulator. Failure to use the correct pressure setting may result in serious damage to the cylinder or cylinder valve. A damaged cylinder may rupture, and can cause serious personal injury or death.

Revolve Air - Cylinder Mounting and Charging

DANGER

IMPORTANT! Before filling breathing air cylinders, ALWAYS check the Department of Transportation (DOT) or Transport Canada (TC) pressure rating of the cylinders to be filled. NEVER fill cylinders a cylinder to a pressure higher than the maximum pressure rating shown on the cylinder. Failure to follow this warning may result in catastrophic failure of the cylinder, leading to serious personal injury or death.



1) Bleed Valve

2) Charge Adapters

CAUTION

NEVER use a wrench or other tool to tighten the bleed valves or cylinder adapters. Excessive force will damage the sealing surfaces and result in cylinder leakage.

1. Close the Fill Control Valve. Slowly open the bleed valve *just enough* to vent any residual pressure. When all air stops escaping, hand-tighten the bleed valve. DO NOT use tools to tighten.
2. Remove one of the adapter caps and attach a cylinder to the charge adapter. Turn counterclockwise to tighten. Hand-tighten the connector. DO NOT use tools to tighten.
3. To charge two cylinders, remove the plug from the other charge adapter and mount the second cylinder. Hand-tighten the charge adapter.

NOTE

Never leave an unused charge adapter open. When charging only one cylinder, verify that the cap is secure on the unused adapter.

Charge Adapter

4. Open the breathing air cylinder valves located on the top of the mounted cylinders.

DANGER

Always open cylinder valves slowly. Careless handling of compressed air can cause pressurized air to release suddenly, which can result in serious injury or death.

5. Open the charging chamber door lock by operating the handle on the right side of the chamber so that the YELLOW lock bars are NOT showing.

6. Rotate the chamber door 180° until it clicks into position.

⚠ CAUTION

Use extreme caution when rotating the chamber door. Catching fingers, hands, hair, articles of clothing, or other objects in the door may result in personal injury or damage to the fill station.

Rotating the RevolveAir Camber Door

7. Close and lock the charging chamber door handle. The door is locked when the YELLOW lock bars are visible around the door frame.

8. Open the Fill Control Valve 1/8 to 1/2 turn counterclockwise to begin filling the cylinders.

9. Consult the cylinder manufacturer and the appropriate government regulatory agency for fill rate recommendations. DO NOT EXCEED THE FILL RATE RECOMMENDATIONS FOR THE BREATHING AIR CYLINDERS BEING FILLED.

⚠ DANGER

DO NOT exceed the recommended fill rate for the breathing air cylinders. Failure to follow this warning may result in catastrophic failure of the cylinder, leading to serious personal injury or death.

Charging Chamber Locked
(YELLOW bars visible around door)

10. Adjust the fill rate as follows:

    a. Slowly turn the Fill Control Valve counterclockwise to increase the rate at which the cylinders are filled.

    b. Watch the pressure reading on the breathing air Cylinder Gauge.

    c. If the fill rate is too high, turn the Fill Control Valve fully clockwise to decrease the flow, then slowly turn the Fill Control Valve counterclockwise to adjust to the proper rate.

    d. Once fill pressure and fill rate are set for charging cylinders of the same pressure rating, minor readjustment may be necessary as the storage and compressor pressures will vary during multiple breathing air cylinder fills.

11. Leave the fill pressure and fill rate set when charging several cylinders that require the same fill pressure and fill rate. Minor adjustments may be necessary during filling of successive cylinders depending on the compressor system used.

12. While the breathing air cylinders are being filled inside the charge chamber, mount the second set of cylinders on the rigid adapters on the outside of the charge chamber. **Be sure to hand-tighten the bleed valve and to open the breathing air cylinder valve(s).** Refer to steps 2 through 4 of this section for details.
13. When the breathing air Cylinder Pressure Gauge reaches the pre-set charge pressure, open the chamber lock by operating the handle so that the YELLOW lock bars are NOT showing. This will automatically stop the cylinder charging process.

⚠ DANGER

If any air leak is noted, or the equipment does not operate as described in this manual, immediately terminate use of the equipment and consult with a certified service technician before proceeding. Use of malfunctioning equipment may create circumstances resulting in serious personal injury or death.

Remove the charged breathing air cylinders as follows:

14. To access the breathing air cylinders, verify that the chamber lock handle is in the unlocked position so that the YELLOW lock bars are NOT showing around the chamber door. Rotate the chamber door 180° until it clicks into position
15. Close the cylinder valves on the mounted breathing air cylinders.
16. SLOWLY open the bleed valve *just enough* to vent the air lines to the cylinders. Vent until all air flow stops. If the air does not stop venting, verify that the cylinder valves are closed.
17. Hold the cylinder in place and turn the charge adapter clockwise to remove the cylinder. Handle the charged cylinder carefully.
18. Replace the charge adapter plugs.

NOTE

HIGH PRESSURE CHARGING causes a rise in cylinder temperature. As the cylinder cools, the pressure gauge will show a decrease in pressure. This is normal. After cooling, cylinders may be placed back in the fill station and "topped off" to full pressure.

⚠ DANGER

Air pressure increases as temperature increases. When charging cylinders in temperatures below freezing (32° F/0° C), frequently check air pressure and release excess pressure as the cylinder warms to normal room temperature. Failure to do so will cause cylinders to be in an overcharge condition, increasing the risk of cylinder failure and leading to personal injury or death.

4 - Guardian Operation

Charging breathing air Cylinders using the Guardian Fill Station

This chapter provides instructions for filling breathing air cylinders using the Guardian Fill Station options.

The Guardian allows simultaneous charging of two breathing air cylinders, and is identified by a top-mounted, closed-lid, total containment chamber.

IMPORTANT

Before charging any breathing air cylinder, ALWAYS perform a thorough cylinder inspection, as instructed on page 8.

⚠ DANGER

Do not refill any cylinder that is damaged or not within the prescribed hydrostatic test date, as determined by the appropriate US Department of Transportation (DOT) specification or the applicable DOT exemption, or in accordance with the appropriate Transport Canada (TC) Permit of Equivalent Level of Safety. Damaged cylinders may suddenly leak or rupture if charged with compressed air. Failure to inspect for damage and to empty the air from damaged cylinders may result in personal injury or death.

⚠ DANGER

If any air leak is noted, or the equipment does not operate as described in this manual, immediately terminate use of the equipment and consult with a certified service technician before proceeding. Use of malfunctioning equipment may create circumstances resulting in serious personal injury or death.

⚠ DANGER

When charging more than one breathing air cylinder together, charge only cylinders that have the same pressure rating. Failure to follow this instruction can result in cylinder failure and lead to equipment damage, serious personal injury, or death.

⚠ DANGER

Do not charge 5500 PSI cylinders with this equipment. Failure to obey this warning may result in serious injury or death.

⚠ DANGER

Air pressure increases as temperature increases. When charging cylinders in temperatures below freezing (32° F/0° C), frequently check air pressure and release excess pressure as the cylinder warms to normal room temperature. Failure to do so will cause cylinders to be in an overcharge condition, increasing the risk of cylinder failure and leading to personal injury or death.

Guardian - Fill Pressure Adjustment

1. Check the pressure rating of the selected breathing air cylinder(s). See "Cylinder Inspection" on page 8.

2. **When charging more than one cylinder, verify that all cylinders are of the same pressure rating.** If they are different, sort them by their rating, and only charge cylinders together that have the same rating. NEVER MIX RATINGS.

⚠ DANGER

NEVER MIX RATINGS! When charging more than one breathing air cylinder together, charge only cylinders that have the same pressure rating. Failure to follow this instruction can result in failure of the cylinder or cylinder valve, and can lead to equipment damage, serious personal injury, or death.

3. Verify that the compressor and/or storage pressure is equal to, or greater than, the fill pressure of the selected breathing air cylinder. If pressure is too low, allow the compressor system to continue building pressure.

4. At the control panel, close the Fill Control Valve by turning the valve fully clockwise.

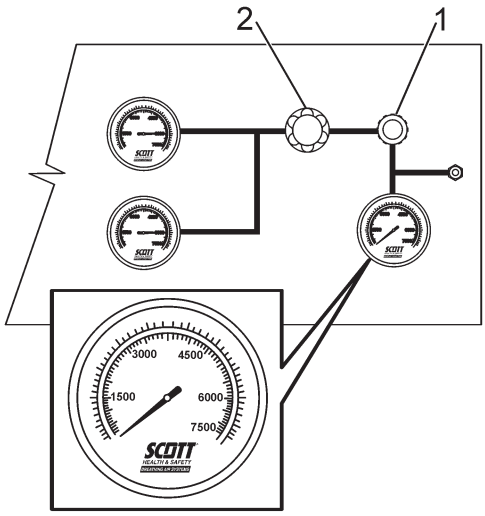
5. For units with the Variable Pressure Regulator: Turn the Variable Fill Pressure Regulator fully counterclockwise until the breathing air Cylinder Pressure Gauge reads zero (0).

   Skip this step if unit is equipped with Dual Pressure Regulator.

6. When system pressure is adequate to fill the cylinders, open the fill station door by turning the handle and lifting the lid.

7. Close the bleed valve in the fill station "finger tight." DO NOT use tools to tighten.

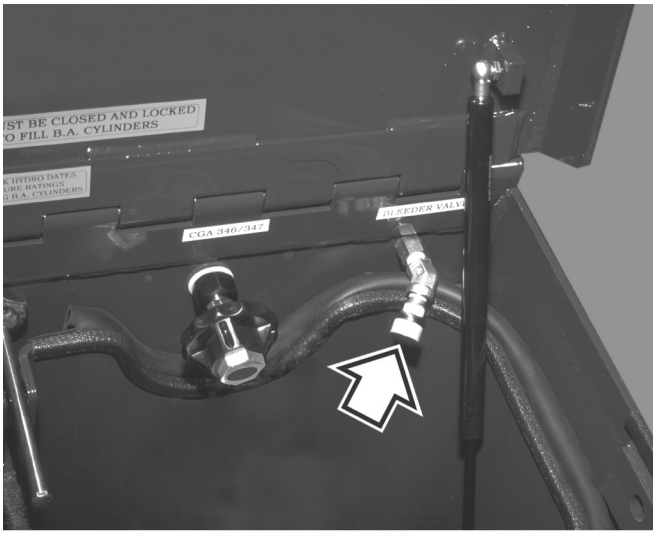
8. Make sure both of the cylinder charge adapters are closed and secure. Hand-tighten, turning the adapter counterclockwise. DO NOT use tools to tighten.



Cylinder Charging Controls

1) Fill Control Valve

2) Variable Pressure Regulator



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Guardian Bleed Valve

⚠ CAUTION

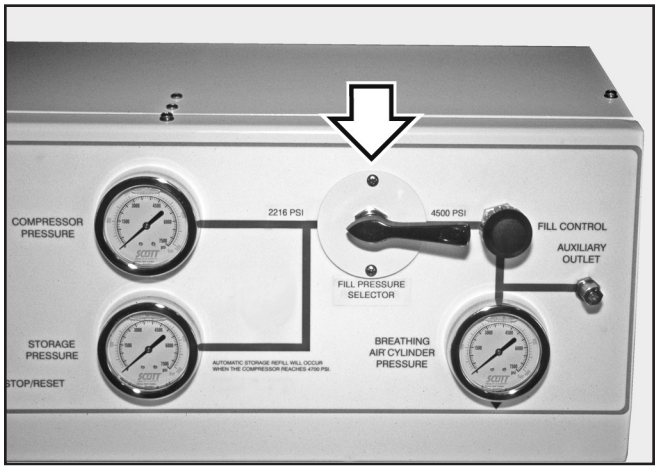
NEVER use a wrench or other tool to tighten the bleed valves or cylinder adapters. Excessive force will damage the sealing surfaces and result in cylinder leakage.

9. Close the fill station lid and lock with the operating handle (with the handle turned horizontally).
10. Open the Fill Control Valve 1/8 to 1/2 turn counterclockwise.
11. For units with the Variable Pressure Regulator: SLOWLY turn the Variable Fill Pressure Regulator knob clockwise until the breathing air Cylinder Gauge shows the target maximum fill pressure for the selected breathing air cylinder(s). **Make sure that the pressure used to charge the cylinder is not higher than the pressure rating on the cylinder.**

NOTE

Always adjust the Fill Pressure Regulator on the "pressure rise." If the fill pressure is accidentally set too high and must be reduced, first turn the knob counterclockwise to at least 500 psi below the desired setting. Turn the knob again clockwise to ensure an accurate fill pressure setting.

12. For units with the Dual Pressure Regulator option, set the switch to the selected breathing air cylinder pressure. No other fill regulator control is available to the operator.



Dual Pressure Regulator Option
Illustration shows pressure set for 2216 psi

⚠ DANGER

DO NOT attempt to charge the breathing air cylinder if the correct pressure setting is not available on the Dual Pressure regulator. Failure to use the correct pressure setting may result in serious damage to the cylinder or cylinder valve. A damaged cylinder may rupture, and can cause serious personal injury or death.

Guardian - Cylinder Mounting and Charging

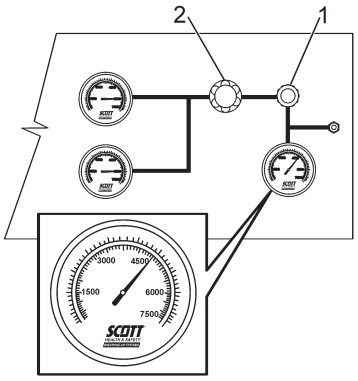
⚠ DANGER

IMPORTANT! Before filling breathing air cylinders, ALWAYS check the Department of Transportation (DOT) or Transport Canada (TC) pressure rating of the cylinders to be filled. NEVER fill a cylinder to a pressure higher than the maximum pressure rating shown on the cylinder. Failure to follow this warning may result in catastrophic failure of the cylinder, leading to serious personal injury or death.

⚠ CAUTION

NEVER use a wrench or other tool to tighten the bleed valves or cylinder adapters. Excessive force will damage the sealing surfaces and result in cylinder leakage.

Charge Adapters



Cylinder Charging Controls

1) Fill Control Valve

2) Variable Pressure Regulator

1. Close the Fill Control Valve.
2. Open the fill station door by turning the handle down and lifting the lid. Slowly open the bleed valve *just enough* in the fill station to vent any residual pressure. When all air stops escaping, hand-tighten the bleed valve. DO NOT use tools to tighten.
3. Remove one of the adapter caps and attach a cylinder to the charge adapter. Turn counterclockwise to tighten. Hand-tighten the connector. DO NOT use tools to tighten.
4. To charge two cylinders, remove the plug from the other charge adapter and mount the second cylinder. Hand-tighten the charge adapter.

NOTE

Never leave an unused charge adapter open. When charging only one cylinder, verify that the cap is secure on the unused adapter.

5. Open the breathing air cylinder valves located on the top of the mounted cylinders.

⚠ DANGER

Always open cylinder valves slowly. Careless handling of compressed air can cause serious injury or death.

6. Close the fill station door and lock with the operating handle (with the handle turned horizontally, as shown above).

Charging Door Locked

7. Open the Fill Control Valve 1/8 to 1/2 turn counterclockwise.
8. Consult the cylinder manufacturer and the appropriate government regulatory agency for fill rate recommendations. DO NOT EXCEED THE FILL RATE RECOMMENDATIONS FOR THE BREATHING AIR CYLINDERS BEING FILLED.

⚠ DANGER

DO NOT exceed the recommended fill rate for the breathing air cylinders. Failure to follow this warning may result in catastrophic failure of the cylinder, leading to serious personal injury or death.

9. Adjust the fill rate as follows:
   a. Slowly turn the Fill Control Valve counterclockwise to increase the rate at which the cylinders are filled.
   b. Watch the pressure reading on the breathing air Cylinder Gauge.
   c. If the fill rate is too high, turn the Fill Control Valve fully clockwise to decrease the flow, then slowly turn the Fill Control Valve counterclockwise to adjust to the proper rate.
   d. Once fill pressure and fill rate are set for charging cylinders of the same pressure rating, minor readjustment may be necessary as the storage and compressor pressures will vary during multiple breathing air cylinder fills.
10. Leave the fill pressure and fill rate set when charging several cylinders that require the same fill pressure and fill rate. Minor adjustments may be necessary during filling of successive cylinders depending on the compressor system used.
11. When the breathing air Cylinder Pressure Gauge reaches the pre-set charge pressure, open the fill station door by turning the handle and lifting the lid. This will automatically stop the cylinder charging process.

⚠ DANGER

If any air leak is noted, or the equipment does not operate as described in this manual, immediately terminate use of the equipment and consult with a certified service technician before proceeding. Use of malfunctioning equipment may create circumstances resulting in serious personal injury or death.

Remove the charged breathing air cylinders as follows:

11. Close the cylinder valves on the mounted breathing air cylinders.
12. Slowly open the bleed valve *just enough* to vent the air lines to the cylinders. Vent until all air flow stops. If the air does not stop venting, verify that the cylinder valves are closed.
13. SLOWLY turn the charge adapter clockwise to remove the cylinder. Carefully lift the charged cylinder from the chamber.
14. Replace the charge adapter plugs.

NOTE

HIGH PRESSURE CHARGING causes a rise in cylinder temperature. As the cylinder cools, the pressure gauge will show a decrease in pressure. This is normal. After cooling, cylinders may be placed back in the fill station and "topped off" to full pressure.

⚠ DANGER

Air pressure increases as temperature increases. When charging cylinders in temperatures below freezing (32° F/0° C), frequently check air pressure and release excess pressure as the cylinder warms to normal room temperature. Failure to do so will cause cylinders to be in an overcharge condition, increasing the risk of cylinder failure and leading to personal injury or death.

NOTES

NOTES

5 - Index

B

breathing air cylinder charging
  Guardian 18
  RevolveAir 12
breathing air cylinders
  date of manufacture 8
  high pressure charging 14, 20
  identification 8
  inspection 8
  pressure rating 8, 10

C

Cascade Storage System
  Manual 5
  Auto 5
Charging breathing air cylinders
  Guardian 15
  RevolveAir 9
Customer Service
  contact information 4

F

Fill pressure adjustment
  Guardian 16
  RevolveAir 10

G

Guardian
  charging breathing air cylinders 18
  fill pressure adjustment 16
  identification 15
  operation 20

M

Maintenance
  routine, general 6

O

Operating guidelines
  working with compressed air 7

P

Pre-operation checks 7
  cylinder inspection 8
  installation 7
Precautions. *See also* Safety Notations
  compressed air 7

R

RevolveAir
  charging breathing air cylinders 12
  fill pressure adjustment 10
  fill rate adjustment 13
  identification 9
  operation 9 15
  turntable chamber door operation 13
Routine maintenance
  general 6

S

Safety
  working with compressed air 7
Safety labels 4
Safety notations
  definition 6
Scott Safety
  contact information 6
Storage Cylinder Inspection
  DOT cylinders 6
  ASME cylinders 6

W

Warranty 3

Maintenance Record

	Task	Date	Initials	Notes
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
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